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Original Communication

Assessment of abuse-related injuries: A comparative study of forensic physicians, emergency room physicians, emergency room nurses and medical students

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Abstract

A comparative study was made investigating whether emergency room physicians, emergency room nurses, forensic physicians, and interns are competent in describing, recognising and determining the possible cause of injuries.

The injury assessment scores varied from good–adequate–fail and remained blank in various participant groups.

Forensic physicians scored significantly better than emergency room staff and interns in the assessment of abuse-related injuries. There were almost no differences noted between emergency room physicians and emergency room nurses. For the functional group with more or less than 4 to 6 years of experience, no significant differences were noted for scoring *good* in all 5 cases.

The fact that forensic physicians scored better than the emergency room staff is probably explained by the fact that almost all practicing forensic physicians have been officially qualified. Training in this field for all professionals involved in such assessment should be mandatory.

Keywords: Assessment of (abuse-related) injuries; Domestic violence; Emergency room physicians; Emergency room nurses; Forensic physicians

1. Introduction

In the Netherlands each year over 500,000 persons are victims of domestic violence (which includes physical and mental abuse) as well as neglect and sexual abuse. 45% of all inhabitants have been victims of one of these forms of violence at atleast once. 11% of this group suffers from permanent physical damage.[1] In the Netherlands more than 200,000 victims are female [2]; another 50,000–80,000 are under 18 years of age.[3] Only a fraction of cases of domestic violence are recognised as such by health care providers.[4] This is partly due to the fact that the history is often unreliable because the victims are often ashamed and frightened to tell the truth about the real cause of their injury. Dutch research results indicate that three-quarters of all general practitioners are of the opinion that assessment and description of these injuries are not the responsibility of attending physicians.[5] Despite this, attending physicians do play a crucial role in the assessment of abuse-related injuries. Half of all general practitioners feel that they are not at all or insufficiently trained in assessing injuries.[5]

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Three-quarters of general practitioners do not feel competent in assessing injuries during a post-mortem examination.[6] Research of Dutch general practitioners shows that only 13% asked to assess injuries were able to judge two out of three cases correctly.[7]

Victims of domestic violence are also treated in emergency rooms. 5–35% of all females seen in emergency rooms are victims of domestic violence. [8–11] Around 10% of all traumas in persons under age arriving in emergency rooms is caused by child abuse.[12,13] This indicates that staff, working in emergency rooms (e.g. physicians and nurses), are important health care providers to victims of domestic violence and could therefore play an important role in early detection and assessment of these injuries.[14]

Holland forensic physicians perform post-mortem examinations in cases where an unnatural cause of death is suspected. During this examination, it is of utmost importance that injuries are detected and correctly assessed. There is also a tendency to involve forensic physicians more frequently in assessing injuries in living victims possibly caused by violence or (sexual) abuse. All working forensic medical doctors are theoretically trained in forensic medicine at the Netherlands School for Public and Occupational Health, and practically at the Police Academy and the Netherlands Forensic Institute. They therefore often serve as medical advisors to the police and justice in cases of survived as well as deceased victims of crime and (fatal) accidents.

If necessary, the deceased is transported to a forensic mortuary for a judicial autopsy which is performed by the forensic pathologist, a separate specialty entirely.

The study addresses the following question: Are emergency room physicians and nurses, forensic physicians and interns competent in describing, recognising and determining the possible causes of injuries?

2. Method

2.1. Study population

Between November 2004 and April 2005, Dutch physicians having forensic medical duties, emergency room physicians, emergency room nurses and interns (students) were asked to cooperate in this study. 104 forensic physicians, 79 emergency room physicians, 84 emergency room nurses and 97 students from Dutch emergency room departments, municipal health services and universities participated in the study ($n = 364$).

2.2. Questionnaire

The study consisted of a set of 5 colour photos (A-4 format) depicting an injury. The participants were requested to describe the lesions and to determine the possible cause. The word lesion instead of injury was deliberately chosen in order not to "trigger" the participants. Age, sex and amount of years of experience were also issues for the participants. The photos were pre-tested in a pilot study (5 participants).

2.3. Cases

Case 1. Slap with a flat hand on the cheek of the face causing haematoma with outline of fingers (so called outline haematoma).
Case 2. Slap on the ear causing petechiae and swelling of the pinna.
Case 3. Strikes with a belt on the buttock causing tramline bruising (a pattern consisting of two lines tapering into one point) (see Fig. 1).
Case 4. Oval haematomas on the abdomen and upper leg of an infant caused by adult human bites during sexual abuse (see Fig. 2).
Case 5. Four round blistering burns on the ventral side of the forearm caused by burn marks from a burning cigarette. This case is an example of self-harm (see Fig. 3).

2.4. Analysis

Two investigators judged independently from each other, the results of the 364 participants. The 5 photos were

Fig. 1. Tramline bruising on the buttock.

Fig. 2. Bite marks on the abdomen and upper leg of an infant.

Fig. 3. Burn marks of a cigarette to the forearm (automutilation).

each individually judged by description as well as possible cause. Assessment was determined beforehand for the proper description as well as probable cause of the injury in determining the categories: good, adequate, insufficient, thereby detering any allowance for different interpretations. With the 27 differences that were present in a total of 3640 judgements, an unambiguous result was reached after a discussion between the two investigators and were based on an improper supplement to the coding system. A complete correct assessment was labelled *good*.

A largely correct description or at least recognition as an abuse-related injury was labelled *adequate*. A wrong description was marked as *insufficient* and if there was no description at all, this was labelled *blank*.

Examples of descriptions in initial cases:

Description: *good* – striped blood contusions with small blood spots with redness and a pale colour at the center of the contusion.

Description: *adequate* – striped red discolouration/with hyperemia with delineated central paleness.

Description: *insufficient* – scratch marks/skin defects/scrape marks.

Cause: *good* – slaps with the palms of the hand suspected case of abuse.

Cause: *adequate* – abuse victim stump trauma caused by blows/hitting.

Cause: *insufficient* – children's disease/a fall/strangling/squeezing.

The identity of the participants was unknown.

The researchers were able to see which professional group the participants were members of without influencing the results because of the precisely determined assignations in the coding agreed upon beforehand.

The data was entered and edited in a program called Access. The statistical analysis included the chi-squared test using SPSS 12.01.1. A difference with a p-value <0.05 was considered statistically significant. Percentages in the study data were rounded out.

3. Results

The study group of forensic physicians consisted of a majority of males (Table 1). The age category 41–50 years was most strongly represented in the group of forensic physicians, 21–30 years of age in the group of emergency room physicians, and 31–40 years of age in the group of emergency room nurses (Table 2).

Almost half of the participants in the three groups had more than 6 years of practical experience in their field of expertise (Table 3).

Forensic physicians and emergency room staff (physicians and nurses) were equally comparable considering the work experience in their various functions.

In the cases of the ear, buttock and abdomen, scores were worse in all professional groups (including students) compared to the scores of the face and arm cases.

Table 1
Gender (%)

Role	M	F
Forensic physicians (FP)	69	31
Emergency room physicians (ERP)	44	56
Emergency room nurses (ERN)	31	69
Students (interns)	46	54

Table 2
Age (year) %

Function	21–30	31–40	41–50	51–60	>60 year
FP	3	26	*42*	26	3
ERP	*42*	25	23	10	–
ERN	18	*45*	29	8	–
Students	95				

Table 3
Number of years of experience (%)

Function	0–2 year	2–4 year	4–6 year	>6 year
FP	19	18	15	47
ERP	30	20	8	41
ERN	19	16	18	46
Students	n.a.			

The student group scored significantly worse than the rest of the groups ($p = 0.000$–0.028) in all five cases both in describing the injury and in determining the causal factor, except for the determination of the cause of the injury to the buttock.

A noted importance was the possible differences in the scores between the various professional groups regarding both the description and the determination of the cause of the injury. In the score *good/good*, the forensic physicians scored in all five cases significantly better ($p < 0.05$) than the rest group (Table 4). Differences between emergency room physicians and emergency room nurses were quantitatively detected only slightly in the cases of the ear and the abdomen.

The scores *good/good*, *good/adequate*, *adequate/good* and *adequate/adequate* were also evaluated. In these categories too, the forensic physicians scored – significantly better ($p < 0.05$) than the rest group in all five cases except in the case of the arm (Table 5). With the exception of the case of the ear, there were no clear differences between emergency room physicians and emergency room nurses in their assessments.

On the basis of the scores *blank/blank*, *blank/insufficient*, *insufficient/blank* and *insufficient/insufficient*, it becomes again apparent that forensic physicians less frequently scored – blank and/or insufficient than the rest group. Particularly in the assessments of the ear, buttock and abdomen cases, this was striking and significant ($p < 0.05$)

Table 4
Comparisons per professional group for the score *good*, relating to description of the injury as well as the determination of the cause, per case in percentages

Function	Head	Ear	Buttock	Abdomen	Arm
FP	48	25	21	27	66
ERP	15*	11*	1*	5*	3*
ERN	18*	2*	3*	1*	42*
Students	18*	1*	1*	1*	19*

* $p < 0.05$.

Table 5
Comparison per professional group for the scores *good/good*, *good/adequate*, *adequate/good* and *adequate/adequate*, relating to description of the injury and determination of the cause, per case in percentages

Function	Head	Ear	Buttock	Abdomen	Arm
FP	92	53	75	69	91
ERP	75*	33*	46*	18*	84
ERN	80*	19*	40*	20*	87
Students	69*	14*	33*	13*	71*

* $p < 0.05$.

Table 6
Comparison per professional group for the scores *blank/blank*, *blank/insufficient*, *insufficient/blank*, and *insufficient/insufficient* relating to description of the injury and determination of the cause, per case in percentages

Function	Head	Ear	Buttock	Abdomen	Arm
FP	1	9	8	12	1
ERP	3	28*	24*	33*	1
ERN	1	48*	30*	48*	4
Students	4	37*	34*	33*	6*

* $p < 0.05$.

[Table 6]. Regarding the *insufficient* score, forensic physicians performed significantly better than the rest group ($p < 0.000$–0.042) with the exception of the case of the arm. In the *insufficient* score, the emergency room physicians performed better than the emergency room nurses with the exception of the case of the face.

Examinations were also made into differences for scoring *good/good* in cases of (participant with) more than 4 years experience (including >6years) compared to less than 4 years experience. There were no statistically significant differences except for the description of the cause of injury to the face and the buttocks ($p = 0.02$–0.04). For the functional groups with more or less than 6 years of experience, no statistically significant differences could be determined.

4. Discussion

One outcome of this study is that, in general, injuries like petechiae, tramline bruising and bite marks were less frequently recognised than outline haematomas and blisters. This is possibly due to the fact that the last two injuries were located on more familiar anatomical locations in comparison to the first three.

The fact that forensic physicians scored remarkably better compared to the rest group was expected. In general, all practising forensic physicians are trained in forensic medicine. Making a distinction between qualified, not qualified or working on qualification was not so relevant in this study because each practising forensic physician performs the same procedures. If only officially qualified forensic physicians would have participated in this study, one may assume that the outcome of this group would have been even better. However, the data shows that this group should also be capable of improving their results.

It was also apparent that no significant assessment differences existed between the emergency room physicians and the emergency room nurses. The fact that these two groups had lower scores than the forensic physicians could be due to a lack of training in assessing abuse-related injuries during their training and residencies.

The fact that students scored the worst could be explained by their having virtually no practical experience and that almost no attention is given to this subject during their training in medical school.

A few critical remarks are relevant and should be mentioned. The injuries were assessed by using colour photos.

This could have hampered the assessment of the injuries. A pilot study proved that the photos were representative enough to be properly assessed. For that matter, more studies made with this literature were created using photo material.[7,15,16] Also notable is that during medical school, a lot of subject matter is taught by means of photos which enables the physician in later life to recognise anomalies with a more complicated case.

5. Conclusions

Aside from general practitioners, pediatricians, gynaecologists and dermatologists, forensic physicians, emergency room physicians and emergency room nurses are in a good position to track down and recognise domestic violence and abuse. That is why these specific professionals need to be competent in diagnosing violence and abuse, especially in cases of injuries. In this way recognition of abuse, support, help as well as mending could be provided to the victims thereby preventing their death. In half of the cases, these measures, if adopted, can put an end to violence.[1]

Training in this field for all involved professionals, as it turns out and remains, is of eminent importance. It is in the interest of justice that injuries are assessed by those with forensic skills, training and education.

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